

## Course Outline

# MATH 1229A-Methods of Matrix Algebra<sup>1</sup>

## 1. Course Information

### Course Information

- *Course Name:* Mathematics 1229A (Methods of Matrix Algebra)
- *Academic Term:* Fall 2024
- *Sections:* Main campus section 200 and all tutorials 002-016.
- *Tutorial Professors:* Hristo Sendov, Khoa Nguyen, Allen O'Hara, Kelvin Chan, Asghar Ghorbanpour

### List of Prerequisites

One or more of Ontario Secondary School MCF3M, MCR3U, or equivalent.

### List of Antirequisites

Applied Mathematics 1411A/B, 2811B, Mathematics 1600A/B, 2120A/B, 2155F/G, 2211A/B.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

## 2. Instructor Information

Instructors	Email
Dr. Hristo Sendov	hsendov@uwo.ca
Dr. Khoa Nguyen	knguyen@uwo.ca
Dr. Allen O'Hara	aohara@uwo.ca
Dr. Kelvin Chan	kchan773@uwo.ca
Dr. Asghar Ghorbanpour (Course Coordinator)	aghorba@uwo.ca

### Course Contact Policies

- Students must use their Western (@uwo.ca) email addresses when contacting their tutorial professors.

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<sup>1</sup> This course outline is subject to change, and any changes will be clearly communicated via the course OWL website.

- Any email sent to the instructor **MUST** say **Math 1229A** in the subject line; Any email without proper subject line, and/or sent from an email other than a Western email, may be deleted unread.
- The primary point of contact for each student is their tutorial professor. Unless instructed otherwise, please do not contact the course coordinator with course-related questions.
- Email is not an efficient way of contact, and response times vary wildly depending on email volume (professors may be receiving tens of emails per day). Students can use office hours meeting for more urgent matters.

### **Office Hours Information**

Each tutorial professor will hold at least two office hours weekly to provide help to the students of their tutorial. Information about day, time, location and format of the office hours will be provided on the course OWL website.

### **Math-Physics Accelerator**

The Mathematics Department runs free in-person and virtual help centres every weekday during the semester, starting September 16. The in-person help centre is located in the Math-Physics Accelerator in PAB 48/49/26 (on the lower level of the Physics and Astronomy Building.)

These help centres are staffed by graduate student teaching assistants and all first-year mathematics courses are supported. No appointments are necessary.

- Information about the help center and other departmental supports for students can be found at: [https://www.math.uwo.ca/undergraduate/current\\_students/Help%20Centre.html](https://www.math.uwo.ca/undergraduate/current_students/Help%20Centre.html)
- Information about other ways to get help will be posted on the course OWL website.

### 3. Course Syllabus, Schedule, Delivery Mode

#### Course Syllabus

Vectors in  $R^m$ ; Equations of lines and planes; Linear Equations; Solution of Linear Systems; Matrix Algebra; Matrix Multiplication and Inverses; Determinants.

#### The Course Learning Outcomes

By the end of this course, students will be able to:

- **Describe**  $m$ -dimensional Euclidean space and carry out the vector operations for vectors in  $R^m$ .
- **Write** algebraic representations (as equation in different form) for different geometric objects such as lines, planes and hyper planes, in  $R^m$ .
- **Recognize** linear equations, systems of linear equations (SLE), and solutions of SLEs.
- **Solve** SLEs using different methods: Gauss-Jordan elimination method, method of inverse matrix and Cramer's rule, if applicable.
- **Perform** basic matrix operations: addition/subtraction, multiplication and powers, inverse, and transpose matrices.
- **State** what the rank of a matrix is, find it and use it to determine the number of solutions of an SLE.
- **Compute** the determinant of square matrices using different methods: expansion along rows/columns and using the properties of determinant.
- **Use** determinant of square matrices to find the inverse of invertible matrices.

#### Course Delivery

This is a blended course with online asynchronous and in-person components:

*Online asynchronous components:* The course content will be posted weekly on the course OWL website, and students can complete them anytime during that week. The online quizzes will come only with a deadline and can be completed during their opening time.

*In-person synchronous components:* Students must attend one hour long tutorial sessions that will be taught by their tutorial professor once a week. The midterm tests and the final exam will take place in-person.

#### Contingency plan

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

#### Key Sessional Dates:

- *Classes begin:* September 5, 2024
- *Last day to add:* September 13, 2024
- *Fall Reading Week:* October 12 – 20, 2024
- *Last day to withdraw:* December 2, 2024
- *Classes end:* December 6, 2024
- *Exam period:* December 9 – 22, 2024

## 4. Course Materials

### Textbook

*Second Custom Edition of Elementary Linear Algebra by S. Venit, W. Bishop and J. Brown, published by Cengage, ISBN13: 978-1-77474-365-2*

or the eBook version of the textbook

*University of Western Ontario\* Custom eBook: Elementary Linear Algebra, 2nd Edition (365 Days/One Year Access)-- SKU: CEB\_\_\_CODEID=46047.*

Both versions of the textbook are available through the Western Bookstore.

### Learning Management System (OWL)

All course material will be posted to OWL: <https://westernu.brightspace.com/>. The course OWL website contains weekly videos teaching the course material. Various useful supplemental materials, such as lecture notes and other videos series, required extra homework problems, practice tests, and solutions to the homework exercises, are posted on the OWL web site (<https://westernu.brightspace.com/>). As well, there are forums on which students may post questions.

Students are responsible for checking the course OWL site (<https://westernu.brightspace.com/>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

### Technical Requirements

In addition to the usual math hardware: pencil, paper, and (if you are human) an eraser, you need to have access to

- Computer or laptop able to run a recent version of web browser such as Chrome, Safari or Firefox.
- Stable high-speed internet connection.
- Working microphone and webcam. (in case of pivoting to online learning)
- Document Scanner device or App. (in case of pivoting to online learning)

### What is expected of the students?

- As a blended course, students learn the course content through online materials on the course OWL website, which will be provided weekly. Following that, students should attend tutorials in which their tutorial professor will review the material covered online in the previous week.
- Students should make a serious effort to learn all course material by reviewing their course notes and the corresponding parts of the textbook after each class.
- Regular homework is an essential part of the course; it is the student's responsibility to keep up with the assigned practice problems and to seek additional help if and when it is needed.

- The student must assume responsibility for staying up to date with course content and for being aware of posted deadlines such as dates for midterm tests and deadlines for online quizzes.
- The student is responsible for being aware of all relevant information posted on the OWL web site.

### **Further Course Policies**

- All students are expected to engage online and in-person in a professional and respectful manner. This includes all interactions with peers, as well as communication between TAs or your Professor. Failure to do so will result in academic discipline.
- Recording lectures or tutorials without the explicit consent of the Professor or TA is grounds for academic discipline.
- Course content created by a faculty member is considered the faculty member's intellectual property; it should not be distributed, shared in any public domain, or sold by a student or other third party without prior written consent of the faculty member.

## 5. Methods of Evaluation

### Grading Scheme and Assessment Dates

The final course grade will be determined by student performance on the following course components:

Online Quizzes (6 quizzes)	10%
Midterm Test	20%
Midterm Test 2	20%
Final Exam	40%
Best of Tests and the Exam	10%

### *Online Quizzes*

Six online quizzes will be released through the "Online Quizzes" tab on the OWL website. The quiz schedule (as well as other information about the quizzes) can be found on the course OWL website. Each quiz consists of eight multiple choice questions covering two sections of the textbook. There will be two attempts to complete each quiz; the questions in each attempt will be randomly generated from question pools and may differ from the others. Of these two attempts, the highest mark will be recorded as the student's quiz grade. The student's best five of the six online quizzes, each counted equally, will be used to calculate the grade for the Online Quizzes component.

Each quiz will be available for a 6-day window and students can take the quiz any time during this window with no time limit. Students should aim to complete all quizzes by the posted deadline. We will leave the quizzes open for 48 hours after the deadline as a grace period with no late penalty.

### *Midterm Tests*

The midterm tests will be in-person and will consist of mostly multiple-choice questions and some written-answer questions. Each test will cover the content of four sections of the textbook.

Here is tentative schedule for the midterms<sup>2</sup>

Midterm Test 1: *Saturday, October 26, 2024, 18:00-19:30*

Midterm Test 2: *Saturday, November 16, 2024, 18:00-19:30*<sup>3</sup>

The location of the test will be announced closer to the test date.

### *Final Exam*

The final exam will cover all the course material with more focus on the last part of the course. It will be a three-hour long exam that will take place in-person and will be scheduled by the Office of Registrars. Similar to the term tests, the final exam consists of mostly multiple-choice questions and some short answer questions.

### *The best of the tests and the exam*

The remaining 10% weight will be assigned to whichever of the two midterm tests and the final exams is the student's best mark.

*Remarks:* NO calculators or other electronic devices or any other aids are allowed on tests and exams.

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<sup>2</sup> The dates/time will be finalized after they are reviewed by the exam central.

<sup>3</sup> Dean's special permission has been obtained to schedule Midterm Test 2 within the last 3 weeks of classes.

See Absence/Missed work policy on the next page.

### **General information about missed coursework**

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/academic\\_consideration\\_Sep24.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf),

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](#).

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:

[https://registrar.uwo.ca/academics/academic\\_considerations/](https://registrar.uwo.ca/academics/academic_considerations/)

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods (Defined by policy)
- Midterm Test 2.

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

### **Evaluation Scheme for Missed Assessments**

#### ***Missed Online Quizzes***

If a student misses an online quiz for a reason that extends beyond the deadline to the end of the 48-hour with-no-penalty period, they can contact the Academic Counseling Office of their faculty of registration immediately and request academic consideration covering the quiz closing date and the 48 hours grace period (please check the "Coursework with Assessment Flexibility" section for some more details and exceptions)

If such academic consideration is granted, the quiz will be opened 48 hours for student to complete it. However, if the academic consideration is granted after the next two online quizzes or after classes end (whichever comes first), the weight of the quiz will be redistributed to other quizzes.

### ***Absence from Midterm Tests***

If you miss a midterm test due to any circumstance, you must provide an academic consideration covering the date of the test. As it is noted previously, students can not use their academic consideration without documentation for the second midterm test.

Makeup examinations for the midterm tests will be available to those who are granted an academic consideration. A makeup test is expected to be scheduled for the week after the original test date.

In cases where a student misses to take a midterm test and the makeup test and can provide an academic consideration for both absences, the weight of the test will be transferred to the final exam.

### ***Absences from Final Examinations***

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under [Special Examinations](#)), especially for those who miss multiple final exams within one examination period.

### **Coursework with Assessment Flexibility**

By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

#### **Flexible Completion**

**Quizzes.** This course has 6 quizzes, and the five quizzes with the highest marks are counted towards your final grade. Should extenuating circumstances arise, students do not need to request Academic Consideration for the first missed quiz. Academic consideration requests will be denied for the first missed quiz. Academic Consideration requests may be granted when students miss more than one quiz, and these additional (2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>...) missed quizzes will be reweighted to the other quizzes.

#### **Deadline with a No-Late-Penalty Period**

Students should aim to complete all quizzes by the posted deadline. We will leave the quizzes open for 48 hours after the deadline as a no late penalty period. No submission will be accepted after that 48-hour period.



## 6. Additional Statements

### Religious Accommodation

When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

<https://www.edi.uwo.ca>.

### Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic\\_Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

### Academic Policies

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

In accordance with policy,

[https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf),

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

*Remarks:* NO calculators or other electronic devices or any other aids are allowed on tests and exams. See Absence/Missed work policy on the next page.

**Scholastic offences** are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

Tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

## Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic-related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

[https://www.uwo.ca/health/student\\_support/survivor\\_support/get-help.html](https://www.uwo.ca/health/student_support/survivor_support/get-help.html).

To connect with a case manager or set up an appointment, please contact [support@uwo.ca](mailto:support@uwo.ca).

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

[http://academicsupport.uwo.ca/accessible\\_education/index.html](http://academicsupport.uwo.ca/accessible_education/index.html)

if you have any questions regarding accommodations.

Learning-skills counsellors at Learning Development and Success (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.